

4,827,139) and under 35 U.S.C. §103(a) as being unpatentable over Wells et al. in view of Efferding or DE 2835392 C2 (hereinafter "DE '392"); Claims 3-5, 13 and 14 were rejected under 35 U.S.C. §103(a) as being unpatentable over Wells et al. in view of Efferding or DE '392 and further in view of Horning (U.S. Patent 3,036,964) or Mogard (U.S. Patent 4,004,972).

With regard to the rejection under 35 U.S.C. §112, first and second paragraphs, Claims 1-3 and 15 have been amended to clarify the subject matters recited therein, and thus the pending claims are believed to be in compliance with the requirements of the statute. Also, these claim amendments are merely cosmetic and are not believed to narrow the original scope of these claims. If, however, the Examiner disagrees, the Examiner is invited to telephone the undersigned who will be happy to work in a joint effort to derive mutually satisfactory claim language.

Briefly, Claim 1 of the present invention is directed to a cask including a basket including a plurality of rectangular plate members capable of absorbing neutrons and alternately piled up vertically, the plurality of rectangular plate members each having a plurality of cutting sections for mutually engaging the plurality of rectangular plate members, the rectangular plate members forming a plurality of cells each configured to hold a spent fuel assembly, the basket having a cross section having a plurality of stepped corners, a barrel main body which shields γ rays and has an inner cavity having a cavity cross section complementing the cross section of the basket, and a neutron shielding body provided in an outer periphery of the barrel main body. By providing such a barrel main body, the number of cells to be inserted in the cask can be increased, while the mass of the barrel main body can be decreased without increasing the size of the cask. At the same time, the ability to shield γ ray and neutron is maintained. Furthermore, the heat conductivity between the basket and

barrel main body is improved since the contacting area between the basket and the barrel main body is increased.

The Office Action asserts that Efferding and Wells et al. anticipate the cask recited in Claim 1, because the circular former plates 7a-j and vessel 2 in Efferding and the inner shell 36 and filler blocks 42, 43, 44 in Wells et al. can be integrally formed, respectively. However, it is respectfully submitted that according to MPEP, the claims are patentable where an insight which is contrary to the understanding and expectations of the art is shown,¹ that "prior art must be considered in its entirety, including disclosures that teach away from the claims,"² and that "if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious."³

According to Wells et al., the Wells et al. structure is better able to withstand various stresses exerted thereto because substantially all of its elements including the inner shell 36 and filler blocks 42, 43, 44 are not attached or connected but are independent of each other.⁴

For example, Wells et al. state in the summary of the invention section as follows:

"Because the various elements are not attached or connected to each other, in the event of a dynamic stress producing accident, ... the stresses produced are not transferred as readily to adjacent elements, ... the stresses do not spread throughout the structure and damage substantially all of the element"

Similarly, according to Efferding, the circular former plates 7a-7j are made of a material having a greater thermal expansion coefficient than that of the inner wall 10 of the vessel 2, thereby allowing the basket structure consisting of the cell assembly 4 and circular former

¹ MPEP 2144.04, citing *Schenck v. Norton Corp.*, 713 F.2d 782, 218 USPQ 698 (Fed. Cir. 1983).

² MPEP 2141.03, citing *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984).

³ MPEP 2143.01, citing *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

⁴ See Wells et al., column 2, lines 45-68, and column 4, lines 33-55.

plates 7a-7j to be frictionally bound inside the inner wall 10 by thermal expansion.⁵ Furthermore, the circular former plates 7a-7j are dimensioned such that the basket structure consisting of the cell assembly 4 and circular former plates 7a-7j is freely received in the inner wall 10 of the vessel 2 when it is inserted, thereby allowing easy assembly and disassembly.⁶ Thus, the integration of the circular former plates 7a-j and vessel 2 in Efferding or the inner shell 36 and filler blocks 42, 43, 44 in Wells et al. would change the principles of their operations and clearly contradicts to the understanding and expectations of these references. As such, Efferding and Wells et al. teach away from the integrations of their elements, and the integrations proposed by the Office Action are believed to be a product of an impermissible hindsight guided by Applicants' disclosure. Applicants also wish to point out that even assuming *arguendo* that the circular former plates 7a-7j are integrally formed in the inner wall 10 of the vessel 2, the resultant structure would have very small contact areas with the cell assembly 4, thus not being able to improve upon the heat conductivity between the vessel 2 and the cell assembly 4. Therefore, it is respectfully submitted that neither Efferding nor Wells et al. teach "a barrel main body which shields γ rays and has an inner cavity having a cavity cross section complementing the cross section of the basket" as recited in Claim 1. On those bases, Applicants respectfully submit that the structure recited in Claim 1 is patentably distinguishable from Efferding and Wells et al., and thus is not anticipated thereby.

Horning discloses a nuclear reactor apparatus, but does not teach "a barrel main body which shields γ rays and has an inner cavity having a cavity cross section complementing the cross section of the basket" as recited in Claim 1. Horning discloses a nuclear reactor having a substantial space between the barrel main body and the cells composing the basket, i.e., the

⁵ Efferding, Abstract, column 2, lines 52-68, and column 3, lines 11-21.

⁶ Id.

shape of the cavity does not correspond with the outer shape of the basket.⁷ Therefore, the structure recited in Claim 1 is distinguishable from Horning.

Likewise, Mogard and DE '392 disclose a nuclear fuel element and a storage frame for nuclear reactor fuel elements, respectively; however, neither one of those references teaches the barrel main body as recited in amended Claim 1. On the other hand, Mogard simply discloses the cladding tube 1 for the nuclear fuel pellets 3, and DE '392 only discloses a storage frame made of intersecting pairs of sheets with slot joints at intersections. Thus, the structure recited in Claim 1 is also distinguishable from Mogard and DE '392.

Because none of Efferding, Wells et al., Horning, Mogard and DE '392 discloses the barrel main body as recited in Claim 1, even the combined teachings of these applied references are not believed to render the structure recited in Claim 1 obvious. Furthermore, because Claim 15 includes subject matter substantially similar to what is recited in Claim 1 to the extent discussed above, Claim 15 is believed to be patentably distinguishable from Efferding, Wells et al., Horning, Mogard and DE '392.

For the foregoing reasons, Claims 1 and 15 are believed to be allowable. Furthermore, since Claims 2-5 and 13-14 ultimately depend from Claim 1, substantially the same arguments set forth above also apply to these dependent claims. Hence, Claims 2-5 and 13-14 are believed to be allowable as well.

Applicants also wish to point out that the number of spent fuel assemblies increases without increasing the outer diameter of the cask, because the number of cells for holding the spent fuel assemblies within the basket can be increased,⁸ that the barrel main body is more

⁷ See Horning, Figure 1.

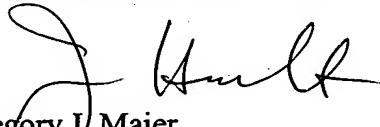
⁸ Specification, page 7, lines 4-7, and page 8, lines 3-4.

compact, because unnecessary space within the cavity can be reduced,⁹ that the barrel main body is more light-weight, because a plurality of dummy pipes can be inserted within the cavity together with the basket,¹⁰ and that a stress is dispersed more uniformly, because the barrel main body can have more uniform thickness.¹¹ It is believed that these advantages have drawn customers' attentions and are contributing to Applicants' commercial success in the business related to Applicants' products.

In view of the amendments and discussions presented above, Applicants respectfully submit that the present application is in condition for allowance, and an early action favorable to that effect is earnestly solicited.

Respectfully submitted,

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⁹ Specification, page 7, lines 2-4.

¹⁰ Id., page 8, lines 3-10, and page 17, lines 10, to page 18, line 11.

¹¹ Id., page 17, lines 10-11.

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IN THE CLAIMS

Please amend Claims 1-3 and 15 as follows:

--1. (Twice Amended) A cask comprising:

a basket including a plurality of rectangular plate members capable of absorbing neutrons and alternately piled up vertically, the plurality of rectangular plate members each having a plurality of cutting sections for mutually engaging the plurality of rectangular plate members, the rectangular plate members forming a plurality of cells each configured to hold a spent fuel assembly, the basket having [an outer shape that has an angular] a cross section having a plurality of stepped corners [with step portions];

a barrel main body which shields γ rays and has an inner [side forming a] cavity[, the cavity] having a cavity cross section [which corresponds with] complementing the [angular] cross section of the basket; and

a neutron shielding body provided in an outer periphery of the barrel main body[, wherein a spent fuel assembly is stored in each of the cells of the basket inserted in the cavity].

2. (Twice Amended) The cask according to claim 1, wherein [only portions of] the inner cavity [have the cross section that corresponds with] has a plurality of portions which do not complement the [angular] cross section of the basket.

3. (Twice Amended) The cask according to claim 1, further comprising a plurality of dummy pipes provided along and in contact with the [step portions] each of stepped corners of the basket, wherein the cavity cross section of the inner cavity corresponds with a cross

section of an outer shape formed by the plurality of dummy pipes and the basket in contact with each other, and the plurality of dummy pipes are inserted within the inner cavity together with the basket.

15. (Amended) A cask comprising:

a basket having [an outer shape that has an angular] a cross section [with step-like portions] having a plurality of stepped corners; and

a barrel main body having [an inner side that forms] a cavity[, the cavity having a cross section that corresponds with] complementing the [angular] cross section of the basket.--